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FOREST INSECT AND DISEASE CONDITIONS

IN ALASKA - 1987

November 1987

FOREST INSECT AND DISEASE CONDITIONS IN ALASKA, 1987

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FOREST PEST CONDITIONS IN ALASKA - 1987

CONDITIONS IN BRIEF

Spruce bark beetle activity decreased in 1987 throughout Alaska. Aerial detection surveys noted 285,110 acres of white, Lutz, and Sitka spruce mortality, a decrease of almost 85,000 acres over 1986 levels. Infested areas include on-going as well as new infestations. The outbreak that was detected in 1986 along the Yukon River south of Galena increased by 18,000 acres and now encompasses 78,000 acres. Scattered infestations still occur on 29,586 acres of the Chugach National Forest. Scattered spruce beetle activity was noted on 46,136 acres near Beluga Lake; down 75,000 acres from a year ago. Ips populations decreased this year near Fairbanks: 3,294 acres of engraver activity was noted versus 17,000 acres detected in 1986.

Spear-marked black moth populations increased slightly this year in interior Alaska: 25,707 acres of paper birch were defoliated. Large aspen tortrix populations decreased by 50% over levels detected last year: 166,231 acres of defoliated aspen were detected. For the second year, more than 17,000 acres of river bottom willow were severely defoliated along the Mulchatna and Yukon Rivers.

A severe winter storm resulted in more than 4,000 acres of white spruce blowdown in south-central Alaska, the majority near Klutina Lake. Hardwood blowdown was prevalent in interior Alaska, specifically from Northway to Tok along the Alaska Highway.

In southeast Alaska, the principal insect pests in 1987 were the spruce beetle and the hemlock sawfly. The spruce beetle infestation in Glacier Bay National Park expanded slightly, and now covers about 18,000 acres. In Yakutat, low-level spruce mortality was detected on 900 acres of forest adjoining windthrow salvage sale units. Spruce beetles were also found in some trees inundated during the glacial closure of Russell Fiord. The hemlock sawfly infestation during 1986 resulted in additional top-kill and hemlock mortality on 1000 acres in 1987. The total area of hemlock top-kill and mortality now exceeds 11,000 acres throughout the southern half of the Tongass National Forest.

Wood decays, hemlock dwarf mistletoe, and Alaska-yellow cedar decline are currently the most important diseases of old-growth forests in Alaska. More than 250,000 acres of dead and dying stands of Alaska-yellow cedar occur in southeast Alaska. The localized outbreak of hemlock canker, caused by Xenomeris abietis, has subsided. Several foliage, twig, and stem pathogens attack the commercially important western hemlock-Sitka spruce young-growth forests of southeast Alaska, but this year none caused appreciable damage. Lirula macrospora, the cause of spruce needle cast, was damaging on Sitka spruce in the Kodiak area. Inonotus tomentosus and an unidentified basidiomycete cause serious root and butt decays of live white and Lutz spruce on the Kenai Peninsula. Canker and stem diseases are destructive on birch, aspen, and other hardwoods in the interior of Alaska.

Porcupines and bears cause significant damage to trees in Alaska.

STATUS OF INSECTS

SPRUCE BEETLE, Dendroctonus rufipennis (Kirby)

Alaska spruce beetle populations decreased in 1987; on-going as well as new infestations now cover approximately 264,810 acres. The decrease was most apparent on the west side of Cook Inlet where 46,136 acres of beetle activity were noted versus 100,000 acres a year ago.

White, Lutz, and Sitka spruce mortality continues on approximately 29,586 acres of the Chugach National Forest; a decrease over the area infested (40,423 acres) in 1986. Spruce beetle activity has not spread on the Chugach but beetles are re-infesting previously impacted stands. Spruce beetle activity is most apparent near Summit Lake, Cooper Landing, and surrounding the Russian River Campground.

Spruce beetle activity increased by 9,000 acres on the Kenai National Wildlife Refuge where 63,099 acres are currently infested; the majority of the infested acres occur in the Mystery Hills and Skilak Lake areas. Infestations are static to declining along the Fox River drainage near Homer where 400 acres of infested spruce are scattered over 7,000 acres. Spruce beetle activity decreased by approximately 1,000 acres and now encompasses 2,587 acres in the Kachemak Bay area. In 1986, 1,168 acres were infested near Mallard Bay within Kachemak State Park. This infestation has now decreased to 701 acres and future declines are expected.

Spruce beetle activity in the Anchorage Bowl and Chugiak-Eagle River areas is decreasing. The area of most activity occurs on Fort Richardson Military lands where 4,600 acres of scattered mortality is evident throughout the spruce-hardwood type.

On the west side of Cook Inlet, scattered spruce beetle activity was noted on 46,136 acres; a 50% decrease over 1986 levels. Most of this scattered mortality occurs to the west and north of Little Mt. Susitna and to the west of Beluga Mountain. Future declines are expected as the beetles, after more than ten years, have attacked and killed the majority of the susceptible host material.

Spruce beetle activity is increasing in other localities in south-central and interior Alaska. The Tiekel River outbreak increased by 3,500 acres and now covers 23,586 acres. Areas most heavily infested continue to occur along the Tiekel River and along the Richardson Highway from Stuart Creek to Pump Station 12. A 63,000 acre outbreak was detected last year along the Yukon River south of Galena. This was the first time that standing spruce has been successfully attacked by the spruce beetle north of the Alaska Range. 1987 aerial surveys detected 78,000 acres of infested spruce. Beetle infestations have crossed the Yukon River and occur in scattered pockets along the south fork of the Nulato River. Infestations are expected to intensify and spread during the next few years. It appears that spruce bark beetles increased in population numbers in the scattered and abundant blowdown which occurs throughout the impacted areas. 1987 spruce beetle infestations by ownership are as follows: National Forest Land--31,056 acres; State and Private--104,875 acres, and other Federal

lands (e.g. Kenai National Wildlife Refuge, National Parks, etc.)--149,179 acres.

A late winter storm was responsible for large areas of spruce and hardwood blowdown throughout south-central and interior Alaska. Thousands of acres of birch and quaking aspen blew down near Northway and Tok. Approximately 5,000 acres of large diameter white spruce managed by the Ahtna Native Corporation blew down along the shore of Klutina Lake near Copper Center. Blowdown was also apparent nearby in the Wrangell National Park. The high potential for spruce beetle build-up is of concern to the affected land managers. The first recorded spruce beetle outbreak in Alaska occurred nearby in the 1920's and covered several hundred thousand acres before it collapsed.

White spruce killed by spruce beetle near Summit Lake

In southeast Alaska, spruce beetle activity was minimal during 1987. Some additional spruce mortality occurred in Glacier Bay National Park, but the total affected acreage did not expand appreciably over 1986 levels. Nearly 18,000 acres have been affected in the Park, with mortality ranging from 5 to 75% of the trees in nearly pure stands of Sitka spruce. Along the outer coast of Glacier Bay National Park, small patches of older spruce mortality were evident between Dundas Bay and Palma Bay. These patches total less than 500 acres and do not appear to be expanding.

Spruce mortality was noted near Yakutat, both in the Forelands and along the edge of Russell Fiord. Beetle-killed spruce were mapped on about 900 acres of forest adjoining two large salvage sale units on either side of the Situk River. The level of mortality within these areas is low, averaging 10 to 20% of the trees, most of which died three to four years ago. Some of the dead trees contain beetle broods, indicating that additional spruce mortality can be expected in the future. In 1986, Hubbard Glacier advanced and sealed off the entrance of Russell Fiord, causing the water level to rise over 80 feet above the normal high tide line. Many spruce were inundated along twelve miles of shoreline in the southern portion of the fiord. Some of those trees were subsequently infested by spruce beetles and ambrosia beetles in the early summer of 1987. The area will be monitored closely in future surveys to detect possible buildup of beetle populations on adjoining forest lands.

No current spruce beetle activity was noted elsewhere in southeast Alaska.

ENGRAVERS, Ips perturbatus (Eichh.)

Scattered engraver infestations were detected on approximately 17,000 acres of State lands near Fairbanks in 1986. 1987 aerial surveys detected only 2,990 acres of infested spruce of which 1,000 acres were heavily infested. The areas most heavily impacted occur within the Bonanza Creek Experimental Forest in spruce stands along new road construction and those bordering recent timber harvest activities.

HEMLOCK SAWFLY, Neodiprion tsugae (Middleton)

Populations of the hemlock sawfly declined throughout southeast Alaska in 1987. Light to moderate defoliation was noted on 1,890 acres as compared to 8,120 acres in 1986. Newly defoliated patches were very small, rarely exceeding 200 acres in size. Most of the defoliation was detected in the southern part of the Forest from southern Etolin Island to southern Prince of Wales Island. Light discoloration occurred in Anita Bay and on Brownson Island (Etolin Island), on Gravina Island near Ketchikan, and in Ingraham Bay, Klakas Inlet, Hetta Inlet and McKenzie Inlet on southern Prince of Wales Island. Further north on Prince of Wales Island, light patches of defoliation were noted near Neck Lake and Luck Lake. On northern Kuiu Island about 300 acres of current sawfly defoliation were mapped in Security Bay.

Most areas which were defoliated by the hemlock sawfly in 1986 generally showed good recovery in 1987. However, in some areas recovery was not complete, with top-kill and tree mortality occurring on about 1100 acres. Most of this new top-kill and hemlock mortality was noted on Prince of Wales Island (Little Ratz Harbor, outer Kasaan Peninsula from Tolstoi Bay to Windfall Harbor, upper Hetta Inlet, and Moira Sound to Cholmondeley Sound). New top-kill was also noted at Anita Bay, and previously undetected damage from 1984 was mapped on Heceta Island between Cone Peak and Timber Knob (250 acres). The total acres with some level of hemlock top-kill or mortality now number 11,010 throughout southeast Alaska.

Information from the ground survey of defoliator plots also showed that sawfly populations are declining. Total larvae collected from the ground plots in 1987 were about 45% of the total collected in the previous year. Larval populations declined most dramatically at Yes Bay (Behm Canal) and Quiet Harbor (Etolin Island). Other substantial decreases were noted on Admiralty Island (Tyee, Glass Peninsula), Baranof Island (Saook Bay), Chichagof Island (Neka Bay, Hoonah Sound), Prince of Wales Island (Moira Sound), Stevenson Island, and Duncan Canal (Kupreanof Island). Populations were still high (but lower than in 1986) at Thorne Island and McKenzie Inlet (Prince of Wales Island). Areas with similar larval counts in 1986 and 1987 included several Prince of Wales Island plots (Kendrick Bay, Dora Bay, Karta Bay, Thorne Bay, Calder Bay), Edna Bay (Kosciusko Island), Smeaton Bay (Misty Fiords National Monument), High Island (Rocky Pass), Point Alexander (Mitkof Island) and Todd (Chichagof Island). Slight increases in sawfly larval counts were noted on southern Prince of Wales Island (West Arm Cholmondeley Sound, Polk Inlet), Kadake Bay (Kuiu Island), and Admiralty Island (North Arm Hood Bay).

Small, localized pockets of sawfly defoliation may be expected in 1988, although populations have declined steadily each year from the high outbreak levels in 1983 and 1984.

WESTERN BLACK-HEADED BUDWORM, Acleris gloverana (Walsingham)

Western black-headed budworm populations were fairly low in 1987, although larval numbers increased by about 60% over 1986. Numbers increased most dramatically in Moira Sound (Prince of Wales Island) and remained at moderate levels at other southern plots including Grace Harbor (Dall Island) and Coning Inlet (Long Island). Slight increases (but low numbers of larvae) were found at McKenzie Inlet and Dora Bay (S. Prince of Wales Island). Other areas with significant numbers of budworm larvae included the West Arm of Cholmondeley Sound, Polk Inlet, and Thorne Bay (S. Prince of Wales Island), Princess Bay (Revillagigedo Island), and Helm Bay (Cleveland Peninsula). Declines in larval numbers were noted at Saks Cove (Misty Fiords NM), Hood Bay (Admiralty Island), and Neka Bay (Chichagof Island).

The second-growth hemlock stand defoliated in 1986 on Tuxekan Island showed very poor recovery in 1987. Many trees in the 80-acre area appear to have sustained top-kill from the single year's defoliation.

SPRUCE BUDWORM, Choristoneura sp.

Light budworm (C. orae) activity was noted on 1,000 acres of white spruce near Copper Center along the Edgerton Highway. Damage to new growth was minimal even though larval populations were high. Budworm activity was also apparent near Palmer, Alaska where 500 acres of white spruce were heavily defoliated.

White spruce defoliated by spruce budworm

COTTONWOOD LEAF BEETLE, Chrysomela sp.

Populations of the cottonwood leaf beetle remained high in 1987, producing defoliation of cottonwood and willow in several areas. Slightly over 1000 acres of cottonwood were defoliated along the Takhin River near Haines. In addition, over 400 acres of cottonwood were defoliated near Grand Plateau Glacier on the outer coast of Glacier Bay National Park. Homeowners in the Mendenhall Valley near Juneau once again reported heavy defoliation of urban cottonwoods and willows.

LARGE ASPEN TORTRIX, Choristoneura conflictana (Wlkr.)

Tortrix populations in interior Alaska declined by 50% from last year's levels. 1987 aerial surveys detected almost 166,231 acres of defoliated aspen. Major areas of defoliation occurred near Fairbanks, Delta Junction, and along the Alaska Highway to Northway. Defoliation levels are expected to decline in 1988. Overall, little aspen mortality is expected.

Aspen defoliated by Large Aspen Tortrix in interior Alaska

SPEAR-MARKED BLACK MOTH, Rheumaptera hastata (L.)

Black moth populations increased slightly throughout interior Alaska. 25,707 acres of defoliated birch were detected last summer vs. 19,000 acres defoliated in 1986. Defoliation was still prevalent southwest of Bettles. Populations are expected to decline in 1988.

GYPSY MOTH, Lymantria dispar (L.)

Two larvae and one male pupa were discovered in 1986 on recently shipped household goods coming into Juneau from the east coast. Pheromone traps placed throughout Alaska did not capture any adults that summer. Pheromone traps were once again placed along the major highways and campgrounds throughout Alaska in 1987. 50 traps placed in residential areas around Juneau yielded no adult gypsy moths. One adult male gypsy moth was trapped in Centennial Park Campground on the out-skirts of Anchorage. Centennial Park is a popular R.V. campground for out-of-state tourists. A thorough ground check will be conducted next spring as well as an expanded trapping program throughout the state.

BUD MOTH, Zeiraphera sp.

Bud moth populations were high in Sitka spruce plantations established by the Russians in the 1830's and by the Forest Service in the late 1940's in and around Dutch Harbor and Unalaska on the Aleutian Islands. The bud moth infestation was heavy; more than 90 percent of the buds were infested, which may result in some growth reduction.

Spruce budmoth (Zeiraphera sp.) defoliation on white spruce

WILLOW DEFOLIATION, Tortricidae

For the second consecutive year, approximately 18,000 acres of willow was heavily defoliated by an unknown tortricid larvae throughout southwestern and interior Alaska. The areas most heavily impacted occurred near the confluences of the Mulchatna and Nushagak Rivers and the Yukon Rivers. Although larval numbers were high, damage appears to be minimal.

WILLOW LEAFBLOTCH MINER, Lithocolletis sp.

A willow leafblotch miner, possibly a species of Lithocolletis, defoliated roadside willows along a four-mile stretch of highway from Peterson Creek to Eagle Beach near Juneau.

MISCELLANEOUS HARDWOOD DEFOLIATION

Approximately 3,000 acres of defoliated aspen, cottonwood, and birch were aerially detected in 1987. The causal agent(s) is not known but the birch aphid (Euceraphis betulae) is suspected of defoliating 1,700 acres of birch throughout interior Alaska.

STATUS OF DISEASES

HEMLOCK DWARF MISTLETOE, Arceuthobium tsugense (Rosendhal) G.N. Jones

Dwarf mistletoe is one of the most important diseases of western hemlock. It infests hemlock stands throughout southeast Alaska as far north as Haines. Old-growth hemlock stands vary in their level of infestation; dwarf mistletoe is absent in some stands but in other stands almost every hemlock is infected. Sitka spruce and mountain hemlock are only rarely infected by this parasite in southeast Alaska. Heavily infected western hemlock trees may have branch proliferations (witches-brooms), bole deformities, and slowed radial growth; heavily infected trees can die.

Infected, non-merchantable hemlock trees are sometimes left standing in cut-over areas. The spread of dwarf mistletoe from these infected residuals is probably the principle form of infestation of young hemlock stands. A demonstration area near Thorne Bay on Prince of Wales Island, Alaska has been installed to provide information on the recognition, biology, impact, and recommended silvicultural techniques for managing hemlock dwarf mistletoe in young-growth stands. The killing of infected residual hemlocks (by girdling or felling) and the care in laying out cutting boundaries to avoid infected old-growth hemlock on clearcut perimeters can help reduce the initial spread to young stands.

SIROCOCCUS SHOOT BLIGHT, Sirococcus strobilinus Pruess.

The incidence of Sirococcus declined somewhat from last year's high infection levels, although this fungus is still causing damage in some young-growth stands in southeast Alaska. Sirococcus attacks the shoots of western hemlock and, to a lesser degree, the shoots of Sitka spruce. Young hemlocks in thinned stands have fewer infections than in unthinned stands and most infections are concentrated in the lower portions of the live crown where they have less effect on tree growth and do not distort the terminal leader.

SHOOT BLIGHT OF ALASKA-YELLOW CEDAR, Apostrasseria sp.

This disease is caused by a newly discovered fungus that is common in naturally regenerating Alaska-yellow cedar (Chamaecyparis nootkatensis) throughout southeast Alaska. Terminal and lateral shoots are killed back 10 cm or so on seedlings and saplings. Growth rates of affected cedars are probably not significantly reduced unless trees are severely attacked. Mature tees were

found to be uninfected by this fungus in an intensive survey of diseases of Alaska-yellow cedar. Seedlings of Alaska-yellow cedar were planted in a variety of forest types on Etolin Island to evaluate if Apostrasseria will attack planted seedlings and to determine if the incidence of disease is different on seedlings in a variety forest types.

SPRUCE NEEDLE CAST, Lirula macrospora (Hartig) Darker

Sitka spruce in the Kodiak area was severely attacked by spruce needle cast this year. In southeast Alaska, the disease occurred at about the same level on Sitka spruce as the previous year. Spruce growing in young-growth stands of southeast Alaska are commonly infected, but most needles are shed in the lower portion of the crown where the fungus has less apparent impact on the trees' height and radial growth. Research conducted this year demonstrated that most infectious spores are produced by the fungus in early spring when spruce buds are breaking and young needles are emerging. Lirula spores are most likely spread by splashing rain water. Once infected, these young needles do not exhibit symptoms until the following year. When these needles are two years old, they become light brown (necrotic), produce the characteristic Lirula fruiting bodies and spores, and are latter shed.

Spruce needle cast caused by Lirula macrospora. The fungus attacks newly emerging needles in spring. Infected needles become reddish brown when they are one year old, and tan-colored when they are two years old.

SPRUCE NEEDLE RUST, Chrysomyxa ledicola Lagerh.

Spruce needle rust was somewhat less abundant than in previous years throughout Alaska; however, it occurred on several thousand acres of white spruce, regardless of age class, in the King Salmon area on the Alaska Peninsula. This area appears to be susceptible to short-term flare-ups of rust as it has occurred there several times in the past decade. Historically, infection levels have remained high for only a year. Since only the current-year's needles are susceptible to infection, spruces must be attacked for several consecutive years for heavy defoliation to occur. Mortality is rare. The spores that infect spruce needles are produced on the alternate host, Labrador-tea (Ledum spp.), a plant that is common in boggy, poorly drained areas. Therefore, only spruce in or near boggy areas are moderately or heavily infected.

SPRUCE BROOM RUST, Chrysomyxa arctostaphyli Diet.

Spruce broom rust is a perennial disease of white, Lutz spruce, Sitka, and black spruce; its incidence changes little from year to year. It is common wherever spruce grows near the alternate host, bearberry or kinnikinik (Arctostaphylus uva-ursi). The disease is common in interior and south-central Alaska, but only occurs in localized areas of southeast Alaska. The rust fungus causes perennial infections that result in large, dense clusters of branches. Top kill or mortality sometimes occur.

HEMLOCK NEEDLE RUST, Pucciniastrum vaccinii (Rab.) Joerst.

Hemlock needle rust occurred at slightly higher-than-usual levels on needles of western hemlock this year. The alternate host for this rust fungus is blueberry (Vaccinium alaskensis How.), a very common component of understory vegetation in hemlock-spruce forests.

WESTERN GALL RUST, Endocronartium harknessii (J.P. Moore) Hirat.

This rust fungus continues to cause spherical galls on branches and main boles of shore pine. Endocronartium is common throughout the distribution of pine in Alaska. This year, another fungus, Nectria macrospora, colonized and killed many of the pine branches with these galls. In cases where galls where on the main bole, Nectria commonly caused top-kill.

FOLIAGE DISEASES OF CEDARS, Gymnosporangium nootkatense Arth. and Didymascella thujina (Durand) Maire

Gymnosporangium on Alaska-yellow cedar and Didymascella on western redcedar occurred at low, endemic levels this year. They neither severely defoliated nor killed cedar trees.

HEMLOCK CANKER, Xenomeris abietis Barr.

The incidence of this disease, which was restricted to hemlock adjacent to roads on Prince of Wales Island in recent years, has subsided. Old damage from the previous several years is still evident, but few hemlock trees were killed this year.

ALASKA-YELLOW CEDAR DECLINE

Decline and mortality of Alaska-yellow cedar persists as one of the most important forest diseases in southeast Alaska. Some 260,000 acres of decline have been mapped during aerial detection surveys. Some cedar trees have probably died throughout southeast Alaska every year since the onset of the problem about 100 years ago. This year, dying, discolored trees were particularly concentrated on the northeast portion of Slocum Arm on Chichagof Island. The patterns of tree death and apparent absence of a pathogen as the primary cause suggest that some form of environmental stress may be the cause of the problem.

The following list of acreage of land affected by Alaska-yellow cedar decline has been calculated from a composite map developed from mapping dead and dying cedar during annual aerial detection surveys conducted over the previous 20 years. Recent research suggests that the total acreage of cedar decline increases very slowly because there is no site-to-site spread of decline. The slow increase in area of cedar decline is a result of encroachment of existing mortality on adjacent stands. Contained within most declining stands are trees that died up to 100 years ago, more recently killed cedars, dying cedars (with red or thin crowns), healthy cedars, and other tree species.

STANDS OF DEAD AND DYING ALASKA-YELLOW CEDAR
IN SOUTHEAST ALASKA

	Acres
NATIONAL FOREST LAND	249,875
Chatham Area	88,272
Juneau Ranger District	466
Hoonah Ranger District	1,556
Sitka Ranger District	
Chichagof I	30,826
Baranof I	46,083
Kruzof I	4,515
Total	81,424
Admiralty Island Nat'l Monument Wilderness	4,826
Stikine Area	103,688
Petersburg Ranger District	
Kupreanof I	41,880
Kuiu I	26,778
Mitkof I	3,269
Woewodski I	1,246
Mainland	4,204
Total	77,377
Wrangell Ranger District	
Etolin I	8,719
Wrangell I	8,407
Zarembo I	4,982
Woronofski I	311
Mainland	3,892
Total	26,311
Ketchikan Area	57,915
Thorne Bay Ranger District	
Prince of Wales I	14,635
Kosciusko I	2,958
Haceta I	467
Total	18,060
Craig Ranger District	
Prince of Wales I	11,053
Dall I. and Long I	467
Total	11,520
Ketchikan Ranger District	
Revillagigedo I	6,227
Gravina I	311
Mainland	8,251
Total	14,789
Misty Fjords Nat'l Mon. Wilderness	
Revillagigedo I	779
Mainland	12,767
Total	13,545
NATIVE LAND	6,383
Prince of Wales I	2,491
Kupreanof I	2,647
Ketchikan area	1,245
STATE LAND	3,590
Sitka area	1,090
Mitkof I	934
Kupreanof I	156
Prince of Wales I	476
Ketchikan area	934
TOTAL LAND AFFECTED	259,848

HEMLOCK FLUTING

Fluting on the boles of western hemlock continues to be a problem throughout southeast Alaska. Hemlocks with fluting have deeply incised grooves and ridges extending vertically along their boles; a condition that reduces the value of hemlock logs because they yield less sawlog volume and bark is contained in some of the wood. The cause of fluting is not known, but researchers have recently explored reasons for this bole deformation and have documented its presence in young hemlock stands.

DECAYS

Heartrot fungi cause substantial loss of wood volume in Alaskan forests. The problem is particularly serious in Alaska where long-lived trees in old-growth forests are still predominant and the slow-growing decay fungi have ample time to cause significant losses. Studies have been initiated to determine the fungi responsible for most of the decay in white and Lutz spruce in south-central and interior Alaska. Results will be available in several years. In southeast Alaska, the following fungi are the most important causes of wood decay:

Sitka spruce-
- Fomitopsis pinicola (Schwartz:Fr.) Karst.
- Phellinus pini (Thore:Fr.) Pilat
- Armillaria sp.
- Phaeolus schweinitzii (Fr.) Pat.
- Laetiporus sulphureus (Bull. ex Fr.) Bond. et Sing.

Western hemlock-
- Fomitopsis pinicola
- Armillaria sp.
- Heterobasidion annosum (Fr.) Bref.
- Laetiporus sulphureus
- Phaeolus schweinitzii
- Phellinus robustus (Karst.) Bourd & Galz.
- Phellinus pini
- Echinodontium tinctorium (Ell. & Ev.) Ell. & Ev.

Western redcedar-
- Poria albipellucida Baxt.
- Phellinus weirii (Murr.) Gilbn.

Heartrot of live Lutz and white spruce occurs on the Kenai Peninsula; it causes the loss of wood volume and contributes to windthrow in recreation areas. Two fungi, Inonotus tomentosus and an unidentified Basidiomycete, cause most of the decay. Both fungi attack the heartwood in the roots and the lower bole of unscarred spruce trees. Besides causing heartrot, I. tomentosus appears to colonize and kill the sapwood and cambium on the roots of live spruces. By killing roots, this fungus weakens live spruce and may make these

trees more susceptible to attack by beetles; thus I. tomentosus may contribute to the large outbreak of spruce beetle in this area.

STATUS OF ANIMAL DAMAGE

PORCUPINE, Erethizon dorsatum

Small patches of porcupine damage were detected in Berners Bay (Lynn Canal), Douglas Island, and Cape Fairweather (Glacier Bay National Park). Porcupines girdle conifers in stands of all ages, although damage seems to be most prevalent in precommercially thinned second-growth stands.

BROWN BEAR, Ursus arctos

Basal scars are caused by brown bears every year on Alaska-yellow cedar trees on Baranof and Chichagof Islands, particularly in the Peril Strait and Slocum Arm areas. Approximately one-half of the cedars in some stands have at least one scar. Other tree species are unaffected. Fresh scars on cedar are produced in spring and have teeth marks in exposed wood. Trees with old scars have associated columns of wood decay that will limit the value of butt logs from scarred trees.

INTEGRATED PEST MANAGEMENT ACTIVITIES

Integrated pest management has been described as a "systems approach to reducing pest damage to tolerable levels through a variety of techniques, including predators and parasites, genetically resistant hosts, natural environmental modifications and, when necessary and appropriate, chemical pesticides." Considering the broad parameters offered by this definition a listing of Region 10 IPM activities conducted by FPM is as follows:

(1) A demonstration area for hemlock dwarf mistletoe management near Thorne Bay on Prince of Wales Island. A trail with nine stops and an accompanying pamphlet have been prepared to instruct forest managers on the recognition, damage, biology, and control methods for this destructive parasite on western hemlock. Non-merchantable hemlocks (residuals) that are infected with dwarf mistletoe are sometimes left standing in clearcut units. The spread of dwarf mistletoe seeds from these infected residuals poses a threat to the productivity of the regenerating young hemlock stand. By killing these residuals (by felling or girdling) at the time of pre-commercial thinning and carefully laying out clearcut boundaries to avoid leaving infected old-growth hemlock on the perimeter, dwarf mistletoe can be kept at non-damaging levels in the young stands.

(2) A continuation of the testing of trap trees treated with a silvicide (MSMA) was again conducted on the Kenai Peninsula in 1987. Uninfested live spruce were treated with a formulation of MSMA (Daconate 6^{R}), and were felled two weeks later prior to spruce beetle flight. The results of the study indicated that although the production of beetle brood was reduced by 85% when compared to untreated check trees; a reduction in attack density (possible repellency) was apparent on the treated trees. Further studies are planned to try to reduce this repellency.

(3) Participation in a cooperative effort with Alaska Agricultural Research Station and the Cooperative Extension Service to provide pest management information to Alaska residents. The program which includes education, research and survey activities, provides integrated pest management information concerning urban forestry and garden and greenhouse pests. This program includes a Teletip recorded message service as well as an IPM Newsletter which is published on a bi-weekly basis.

There were four full-time pest scouts and one half-time pest scout employed from May until the end of September in Fairbanks, Delta Junction, Palmer, and Anchorage. Two additional half-time pest scouts were also hired; one in Soldotna and one in Juneau. It is anticipated that these positions will become full-time next field season. In addition, there are four Extension Agents working with the program.

(4) The initiation of a demonstration area in the Granite Creek area of the Chugach National Forest. More than 2,000 acres of spruce/hemlock forests as well as a developed campground have been set aside to promote vegetative management practices for the reduction and prevention of spruce beetle infestations. A selective cut and fertilization study will be initiated this winter on a 13 acre island directly across from the Granite Creek Campground which has been set aside for research purposes. Additional

selective cuts have been scheduled as outlined in the Environmental Analysis prepared by the Anchorage Ranger District of the Chugach National Forest.

(5) The testing of systemic insecticide implants for the prevention of spruce bark beetle attacks as well as the use of these implants as a remedial treatment for attacked spruce was initiated in May of 1987. Treatment efficacy will not be known until later this year.

1987 FOREST INSECT AND DISEASE INFESTATION
IN ALASKA BY LAND OWNERSHIP AND PEST IN ACRES

Pest	National Forest	Other Federal	Native	State & Private
Spruce Beetle *Dendroctonus rufepennis*	31,056	149,179	32,861	72,014
Engravers *Ips perturbatus*		304		2,990
Large Aspen Tortix *Choristoneura conflictana*		12,743	523	152,965
Spear-Marked Black Moth *Rheumaptera hastata*		901	5,439	19,367
Spruce Budworm *Choristoneura* sp.				1,500
Black-headed budworm *Acleris gloverana*	100			
Hemlock Sawfly *Neodiprion tsugae*	8,850		4,050	
Cottonwood leaf beetle *Chrysomela* sp.		450		1,050
Willow Defoliation		10,493	7,317	
Other Hardwood Defoliation		254		2,711
Leaf Blotch Miner *Lithocolletis* sp.	20			
Raised Water Table	450			
Alaska-yellow cedar decline	249,875		6,383	3,590
Totals:	290,351	174,324	56,573	255,137

State Total (Insects and Diseases)[1/]: 777,435 acres

[1/] These values do not include many of the most destructive diseases (e.g., wood decays and dwarf mistletoe) because these losses are not detectable in aerial surveys.

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SUBMITTING INSECTS AND DISEASES FOR IDENTIFICATION

People interested in obtaining identification of insect and disease specimens should submit samples to specialists. The following procedures for the collection and shipment of specimens should be used:

I. Specimen collection:
   1. Adequate material should be collected
   2. Adequate information should be noted, including the following:
      a. Location of collection
      b. When collected
      c. Who collected the specimen
      d. Host description (species, age, condition, # of affected plants)
      e. General description of area (eg, old or young forest, bog, urban); unusual conditions (e.g., frost, poor soil drainage, mis-application of fertilizers/pesticides?).
   3. Personal opinion of the cause of the problem is very helpful

II. Shipment of specimens:
   1. General: Pack specimens in such a manner to protect against breakage.
   2. Insects: If sent through the mail, pack so that they withstand rough treatment.
      a. Larvae and other soft-bodied insects should be shipped in small screw-top vials or bottles containing at least 70% isopropyl (rubbing) alcohol. Make certain the bottles are sealed well. Include in each vial adequate information, or a code, relating the sample to the written description and information. Labels inserted in the vial should be written on with pencil or India ink. Do not use a ballpoint pen, as the ink is not permanent.
      b. Pupae and hard-bodied insects may be shipped either in alcohol or in small boxes. Specimens should be placed between layers of tissue paper in the shipping boxes. Pack carefully and make certain that there is very little movement of material within the box. Do not pack insects in cotton.
   3. Needle or foliage diseases : Do not ship in plastic bags. Sprinkle lightly with water before wrapping in newspaper. Pack carefully and make sure that there is very little movement of material within the box. Include the above collection information. For spruce and other conifers, include a description of whether current year's-needles, last-year's needles, or old-needles are attacked.
   4. Mushrooms and conks (bracket fungi): Do not ship in plastic bags. Either pack and ship immediately, or first air dry and then pack. To pack, wrap specimens in dry newspaper and pack into a shipping box with more newspaper. If on wood, include some of the decayed wood. Be sure to include all collection information.

III. Shipping:
   1. Ship as quickly as possible, especially if specimens are fresh and not air-dried. If samples cannot be shipped rapidly, then store in a refrigerator.
   2. Include address inside shipping box.
   3. Mark on outside: "Fragile: Insect-disease specimens enclosed; For scientific purposes only; No commercial value."

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